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AT&T 3B2/300 Computer Expanded Input/Output Capability Manual

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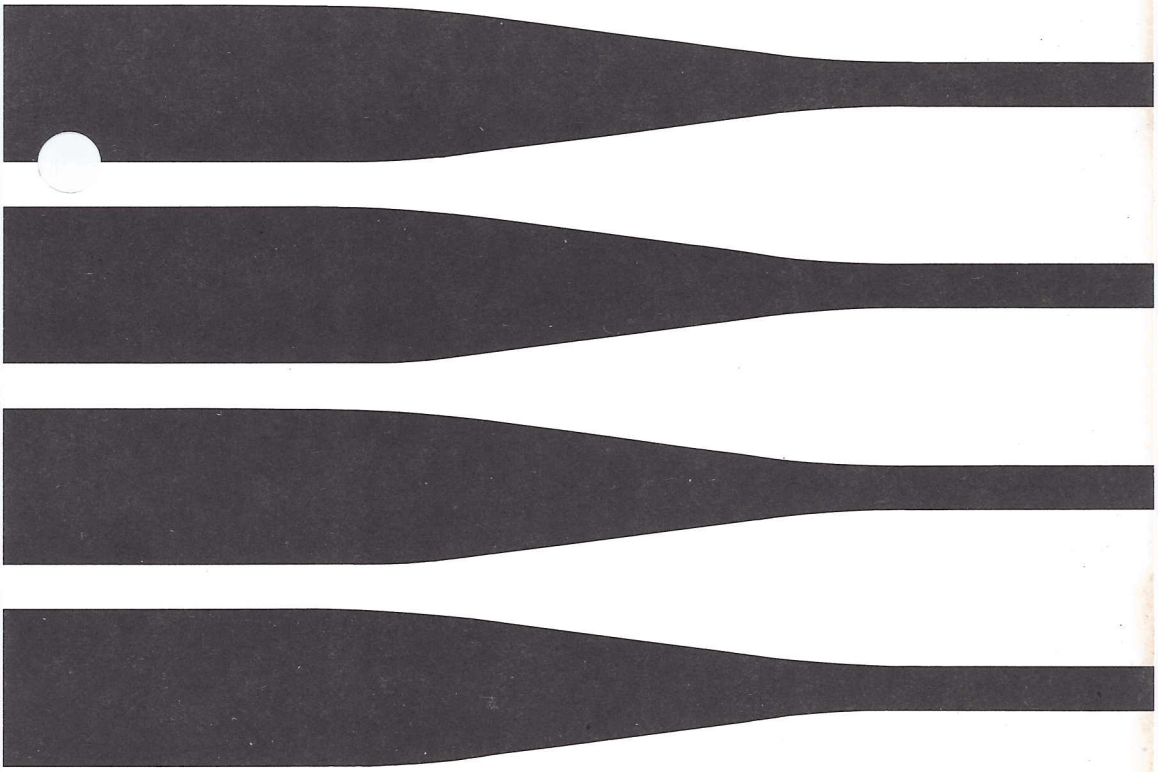

TRADEMARKS

The following trademark is used in this manual.

- UNIX — Trademark of AT&T Bell Laboratories.

NOTICE

The information in this document is subject to change without notice. AT&T Technologies assumes no responsibility for any errors that may appear in this document.

NOTE

The information in this manual describes one of the options available with the 3B2 Computer. An OPTIONS binder is provided with each 3B2 Computer. Remove this document from its soft cover, place the provided tab separator in front of the title page, and file the material in the OPTIONS binder.

If you ordered extra copies of this manual, they should be left in their individual soft covers.

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Chapter 1

INTRODUCTION

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Chapter 1

INTRODUCTION

This manual describes the Expanded Input/Output Capability feature of your AT&T 3B2/300 Computer. In order to use this manual properly, you should be somewhat familiar with microcomputers, computer devices, and the UNIX* Operating System.

FEATURE DESCRIPTION

The Expanded Input/Output Capability feature is an optional 3B2 Computer add-on feature. It adds extra ports, called expansion ports, so you can connect more computer devices such as terminals, modems, and printers. This feature consists of add-on 3B2 Computer hardware.

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* Trademark of AT&T Bell Laboratories

Feature highlights include:

- Adds up to 16 serial and 4 parallel ports total (4 serial ports and 1 parallel port per feature card)
- Uses the standard RS-232-C serial interface, the one adopted by the Electronics Industry Association
- Uses the standard parallel interface, popular with many manufacturers of parallel printers
- Uses plug-in type connections.

MANUAL ORGANIZATION

The remainder of this feature manual is divided into the following five chapters:

- Chapter 2, " FEATURE DESIGN," describes the parts of your feature and how they operate together. General design specifications are also included.
- Chapter 3, " INSTALLATION OR REMOVAL," gives you the steps to install, remove, and test your feature.
- Chapter 4, " OPERATION," tells you how to setup and use this feature correctly.
- Chapter 5, " TROUBLESHOOTING," tells you how to clear trouble with your feature.

UNPACKING INSTRUCTIONS

Inspect the box for damage. If you find any, contact the shipper or your service representative immediately.

To unpack:

1. Carefully remove contents and place them near your 3B2 Computer. Figure 1-1 is a list of parts for the Expanded Input/Output Capability feature.

Caution: While handling a feature card, do not wear any metal rings, and always hold a card by the edges — like a record album.

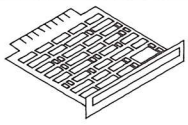
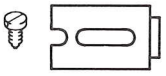
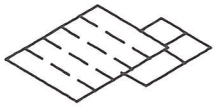
QUANTITY	SIZE	ITEM	FIGURE
1	6 X 7 INCHES (15 X 23 CM)	FEATURE CARD MODULE CIRCUIT COMCODE 103924064	
1	.8 X .9 INCHES (2 X 2.3 CM)	GROUND CLIP WITH 4-40 SCREW	
1	PACKAGE	LABELS (PEEL-AND-STICK)	

Figure 1-1. List of Hardware

2. Carefully remove the protective packing from your feature card.

3. Check card for any obvious defects (loose components, cracks, etc.).

4. If any parts are missing or damaged, contact your service representative.

IMPORTANT REMINDERS

General

1. Read this manual and your *3B2/300 Computer Expanded Input/Output Capability Updates* document (if provided) BEFORE installing or using this feature.

2. Keep this manual handy in your computer library. Store it with your other soft-cover feature manuals in your *Options* binder.

Safety

1. Be alert for sharp edges when handling hardware.

2. Always unplug your 3B2 Computer before removing cover.

3. Follow instructions carefully to avoid personal injury or equipment damage.

Hardware

1. Before installing, protect your feature hardware from:

Sunlight	Chemicals
Heat	Breakage
Cold	Grime

Static Electricity

2. Do not disturb other 3B2 Computer hardware.

Chapter 2

FEATURE DESIGN

PAGE

Chapter 2

FEATURE DESIGN

HARDWARE

Hardware for the Expanded Input/Output Capability feature consists of a feature card (Figure 2-1).

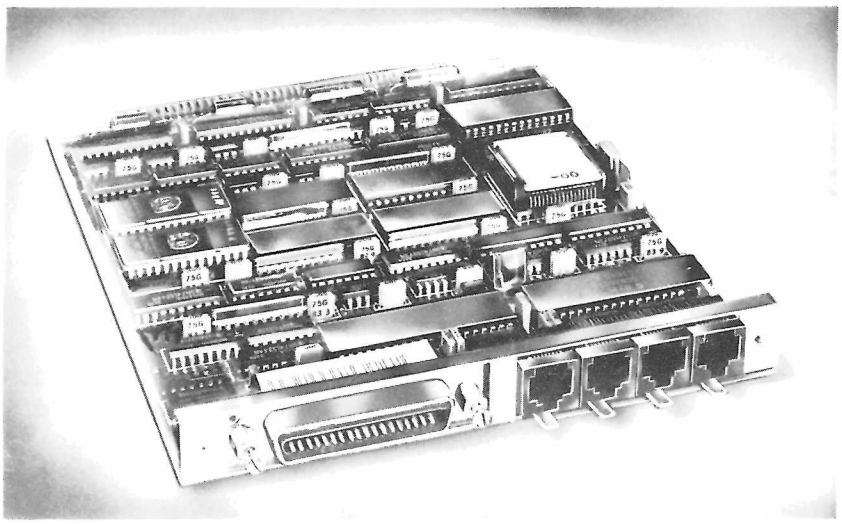


Figure 2-1. Expanded Input/Output Capability Feature Card

This feature card contains electronic hardware and firmware to connect (or interface) more computer devices to your 3B2 Computer. Each feature card adds one parallel and four serial ports.

A parallel port provides a standard parallel interface using a standard 36-pin jack, the kind popular with many manufacturers of parallel printers.

Each expansion serial port provides a standard RS-232-C serial interface, the kind adopted by the Electronic Industries Association. Expansion serial ports are asynchronous full duplex, and use 8-pin modular jacks.

SOFTWARE

Software for the Expanded Input/Output Capability feature came with your 3B2 Computer. This includes software necessary to load instructions into hardware, perform diagnostics, execute device files, and do Simple Administration. Each time your system is booted, resident software automatically loads instructions for each feature card and runs diagnostics on it. You use Simple Administration to set the operating characteristics of each expansion port.

OVERVIEW

Each expansion port provides a means to connect another device and to provide buffering. Buffering ensures operational compatibility with serial or parallel devices connected to your 3B2 Computer.

Your 3B2 Computer came equipped with two serial ports. For each Expanded Input/Output Capability feature card you add, you add four expansion serial ports (asynchronous full duplex) and one parallel port. Slot space permitting, you can add up to four feature cards for expansion ports (Figure 2-2). This can give your 3B2 Computer a total of up to eighteen serial ports.

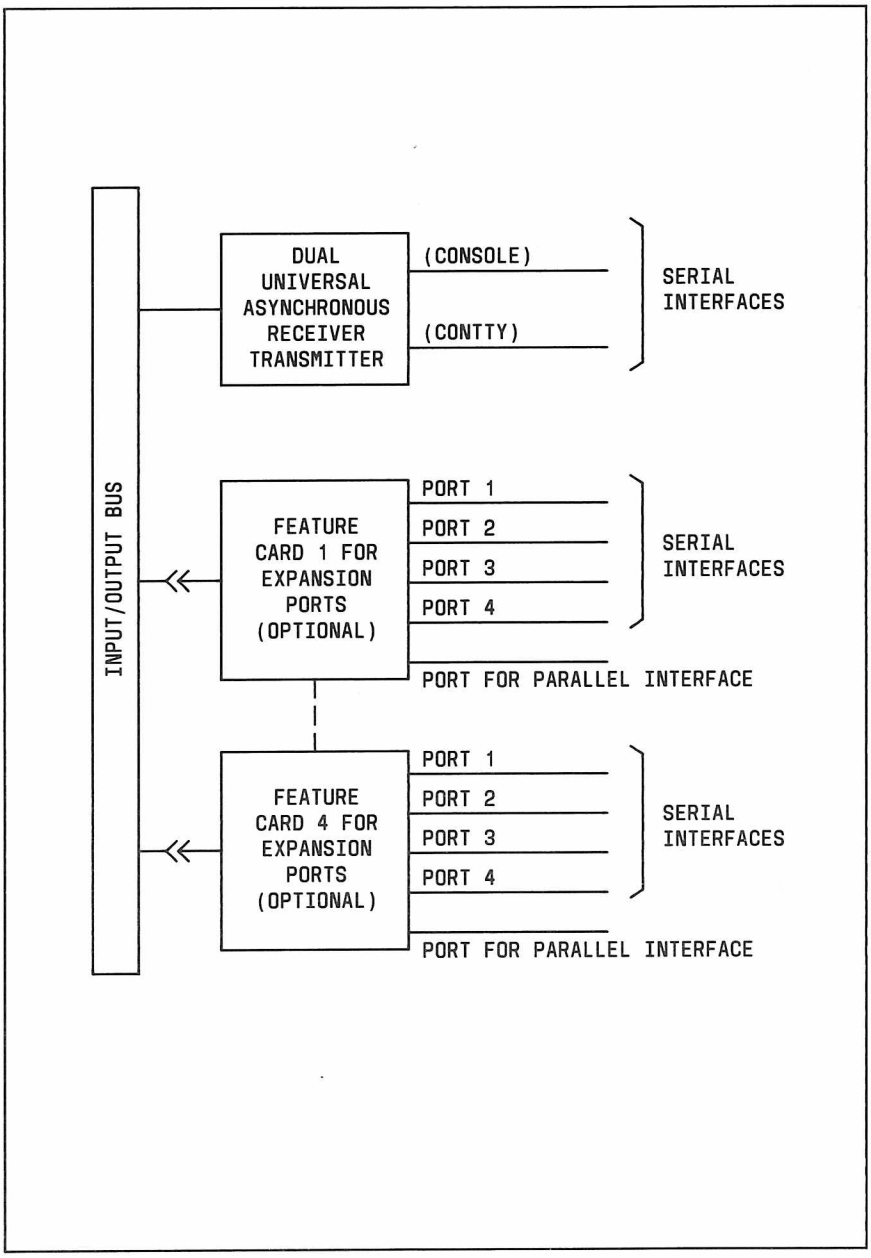


Figure 2-2. Feature Diagram

As the number of logged-on users increases, input/output performance decreases. Each feature card supports simultaneous output to four expansion serial ports, each set at 300, 1200, 2400, 4800, 9600, or 19200 baud. The actual output rate may be somewhat less than the output rate set by the user, depending on the number of ports in continuous use. In this document, the term baud means the same as bits-per-second.

Each feature card can receive continuous character input without flow control or data loss through two serial ports at 9600 baud, three serial ports at 4800 baud, or four serial ports at 2400 baud and below. These limits are important for machine-to-machine communication applications only. For normal typed inputting or applications using flow control, all the expansion serial ports of a feature card can be used at any allowable baud rate. If precise character input/output performance is critical to your application, contact your service representative.

Normally, a 3B2 Computer will use one parallel port for connecting a parallel printer. A parallel port has no known operational limitations.

SPECIFICATIONS

Feature Card

Each feature card is designed for:

- Single width [6 inches (15.2 cm) wide x 7 inches (17.8 cm) deep x 0.7 inches (1.8 m) high]
- Four serial asynchronous full duplex ports using 8-pin modular jacks
- 19200 baud maximum per expansion serial port

- One parallel port using 36-pin jack
- 0 degrees to 70 degrees Celsius operating temperature
- 10 watts dissipation (typical).

Card Components

Major feature card components are:

- 80186 microprocessor
- 2681 Dual Universal Asynchronous Receiver Transmitter circuits
- 32768 byte static random access memory
- 16384 byte read-only memory and firmware
- 16-bit data bus
- 16-bit memory width (no parity)
- On-board data buffers
- Direct memory access for bulk data transfers
- Connections to data, address, and control buses.

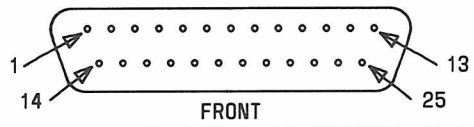
Pinouts

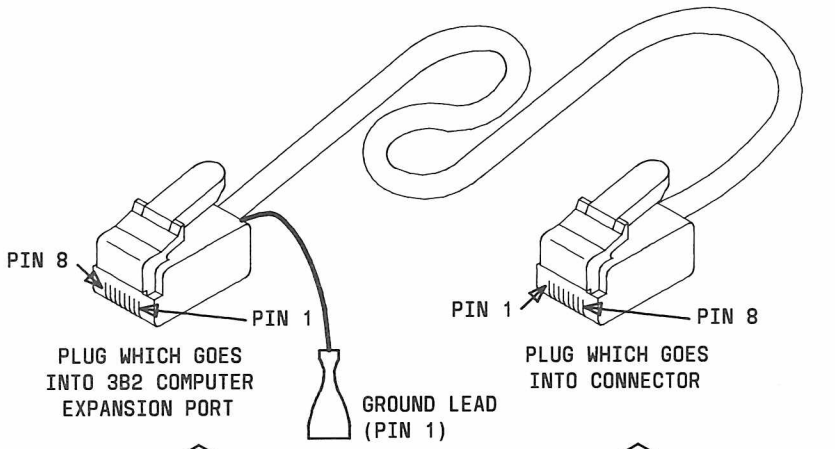
Figures 2-3 and 2-4 contain pinout information.

8-PIN MODULAR JACK	25-PIN RS-232-C JACK OR PLUG FOR PRINTER OR TERMINAL	25-PIN RS-232-C PLUG FOR AUTOMATIC DIAL MODEM
1 PROT GRD	1 FRAME GROUND	1 FRAME GROUND
2 RESERVED	4 RESERVED	5 RESERVED
3 TXDO	3 TRANSMIT DATA	2 TRANSMIT DATA
4 DTRO	8 DATA TERMINAL READY	20 DATA TERMINAL READY
5 RXDO	2 RECEIVE DATA	3 RECEIVE DATA
6 DCDO	20 DATA CARRIER DETECT	8 DATA CARRIER DETECT
7 SIG GRD	7 SIGNAL GROUND	7 SIGNAL GROUND
8 RESERVED	5 RESERVED	4 RESERVED

SEE PIN DIAGRAM BELOW

RS-232-C CONNECTOR





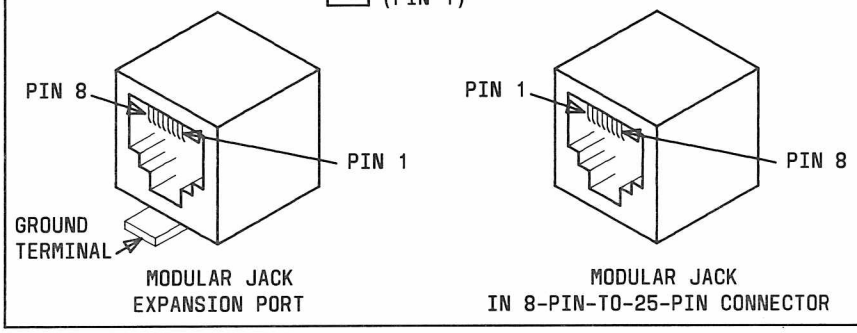


Figure 2-3. Pinouts for Serial Ports

PIN	DESCRIPTION	DESIGNATION
1	DATA STROBE	PRSTB0
2	DATA BIT 1	PRPA01
3	DATA BIT 2	PRPA02
4	DATA BIT 3	PRPA03
5	DATA BIT 4	PRPA04
6	DATA BIT 5	PRPA05
7	DATA BIT 6	PRPA06
8	DATA BIT 7	PRPA07
9	DATA BIT 8	PRPA08
10	NO CONNECTION	NC
11	BUSY	PRBUSY1
12	PRINTER ERROR	PRPE1
13	SELECT	PRSEL1
14	±0 VOLTS SIGNAL GROUND	GRD
15	NO CONNECTION	NC
16	GROUND	GRD
17	FRAME GROUND	FRAME GROUND
18	NO CONNECTION	NC
19-29	GROUND	GRD
30	GROUND	GRD
31	INPUT PRIME	PRRESTO
32	FAULT	PRFALTO
33	GROUND	GRD
34	NO CONNECTION	NC
35	NO CONNECTION	NC
36	NO CONNECTION	NC

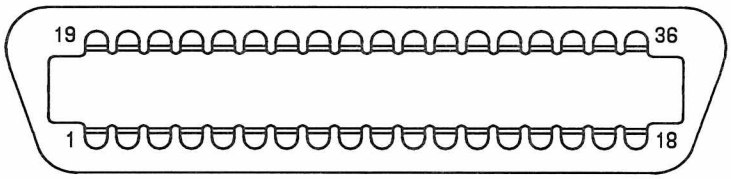


Figure 2-4. Pinouts for Parallel Ports

Chapter 3

INSTALLATION OR REMOVAL

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Chapter 3

INSTALLATION OR REMOVAL

PREPARATION

To add the Expanded Input/Output Capability feature to your 3B2 Computer, you must install your feature card first. Then, using Simple Administration menus, setup your expansion ports. Estimated time for installation is about 1 hour, depending upon your experience. If this feature was installed for you, skip to Chapter 4.

Before beginning installation, do the following:

- Obtain a small flathead screwdriver
- Review reminders in Chapter 1
- Read Chapter 3 at least once.

Installation will be relatively easy if you follow each step carefully.

SOFTWARE

Install

Software for the Expanded Input/Output Capability feature came with your 3B2 Computer. This software does everything automatically except set the operating characteristics of each expansion port.

Remove

Software for this feature cannot be removed. It is part of the UNIX Operating System kernel, a set of programs resident on hard disk.

HARDWARE

Add

Adding hardware follows this outline:

A. Remove computer cover

B. Install feature card(s)

C. Replace computer cover.

A. Remove Computer Cover

1. If your 3B2 Computer is running, turn it off according to your *3B2 Computer Owner/Operator Manual.*

2. Unplug power cord.

3. Remove the cable access door. To remove, release latch, lift door, and pull up. See Figure 3-1.

4. Remove four screws holding top cover.

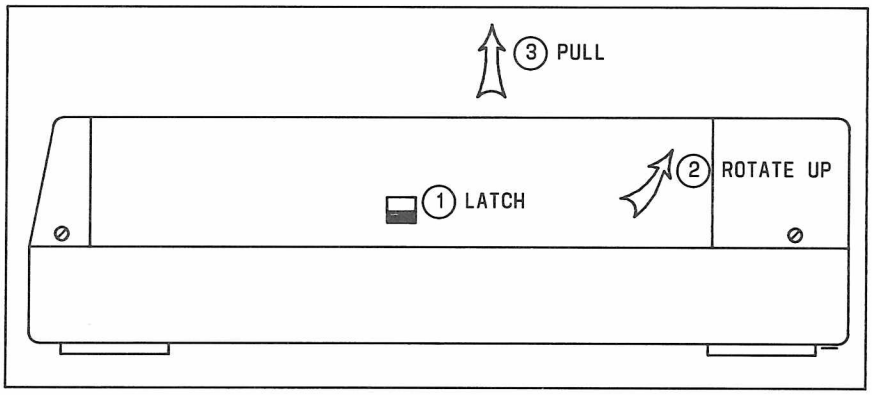

Figure 3-1. Removing Cable Access Door

B. Install Feature Card(s)

1. Select next available backplane slot (Figure 3-2).

Caution: You must use the next available backplane slot following the 1-2-3-4 order. Never skip a backplane slots.

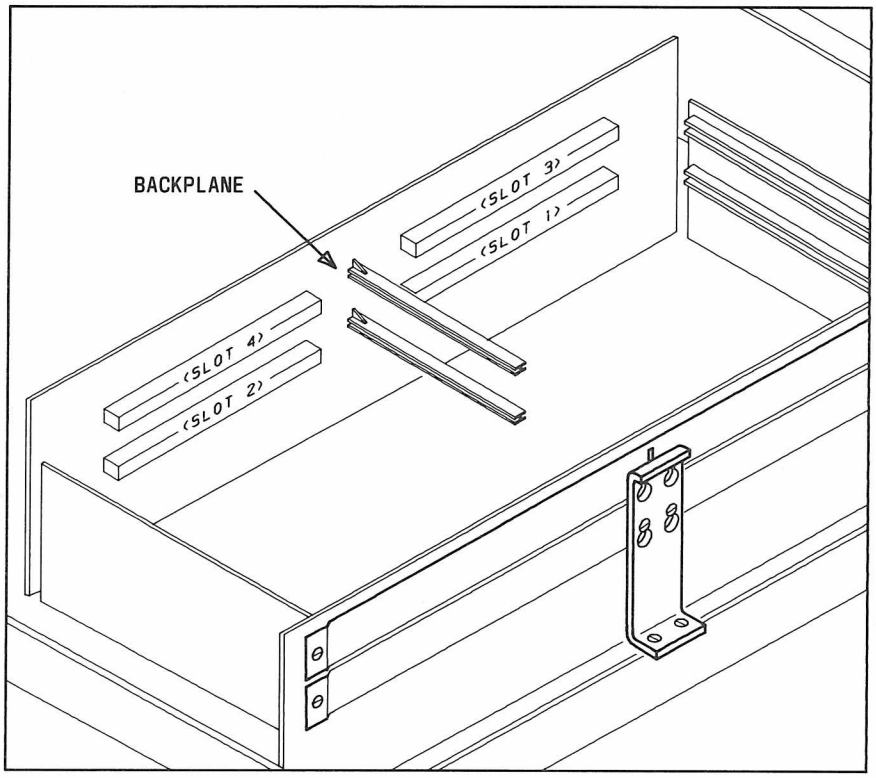

Figure 3-2. Backplane Slots

2. Loosen four screws holding the ground strap to the filler plates (Figure 3-3).

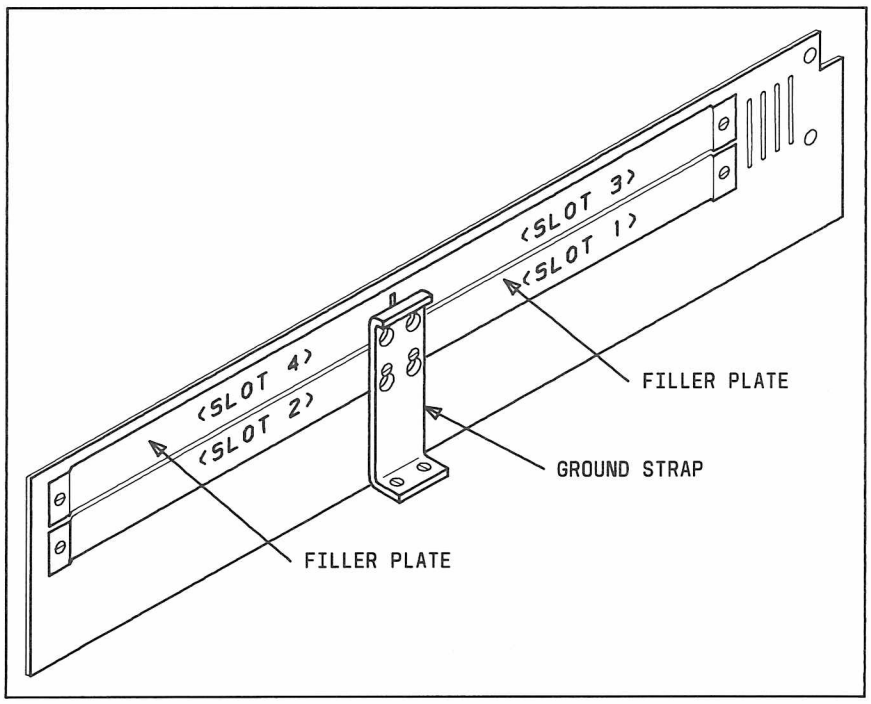

Figure 3-3. Filler Plates

3. Remove two screws holding ground strap to chassis (Figure 3-3).

4. Remove ground strap.

5. Remove filler plate where feature card will be installed.

Note: If filler plate covers two feature card slots:

A. Remove filler plate screws on ends.

B. Break filler plate in two (Figure 3-4).

C. Install half over slot not being used.

D. Save other half in case you remove card later.

Warning: Failure to replace filler plates over unused slots will disrupt cooling airflow and may cause radiation noncompliance with Class A limits of Subpart J, Part 15 of FCC Rules.

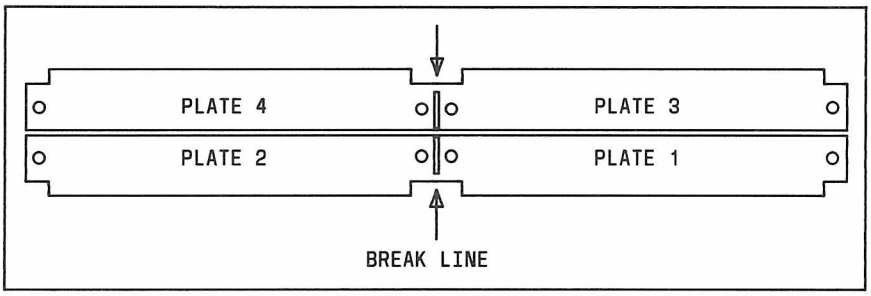

Figure 3-4. Breaking Filler Plates

6. Insert feature card (Figure 3-5).

Warning: Handle feature card like a record album — only by the edges of the card.

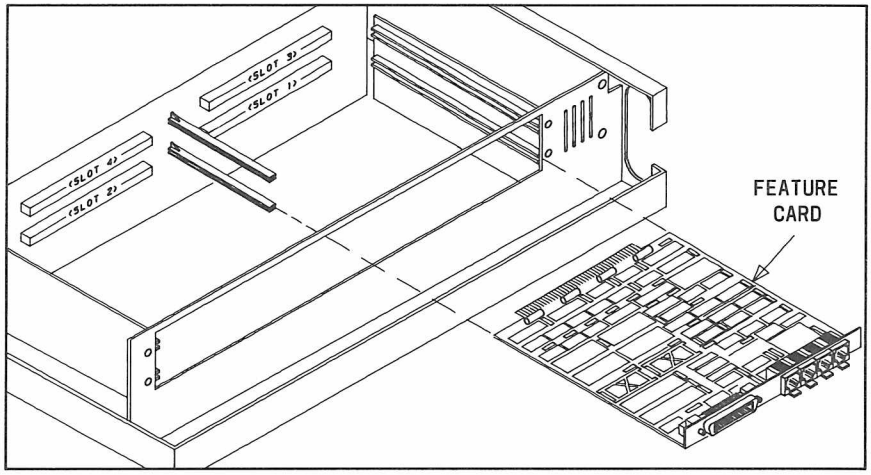

Figure 3-5. Inserting Feature Card

7. Are you installing another feature card at this time?

IF	THEN
Yes	Go back to Step B-1
No	Continue to next step

8. Install ground strap and ground clip (Figure 3-6). Start all screws before tightening any of them.

   Note: Always install ground clip at outside end of faceplate, opposite from the ground strap.

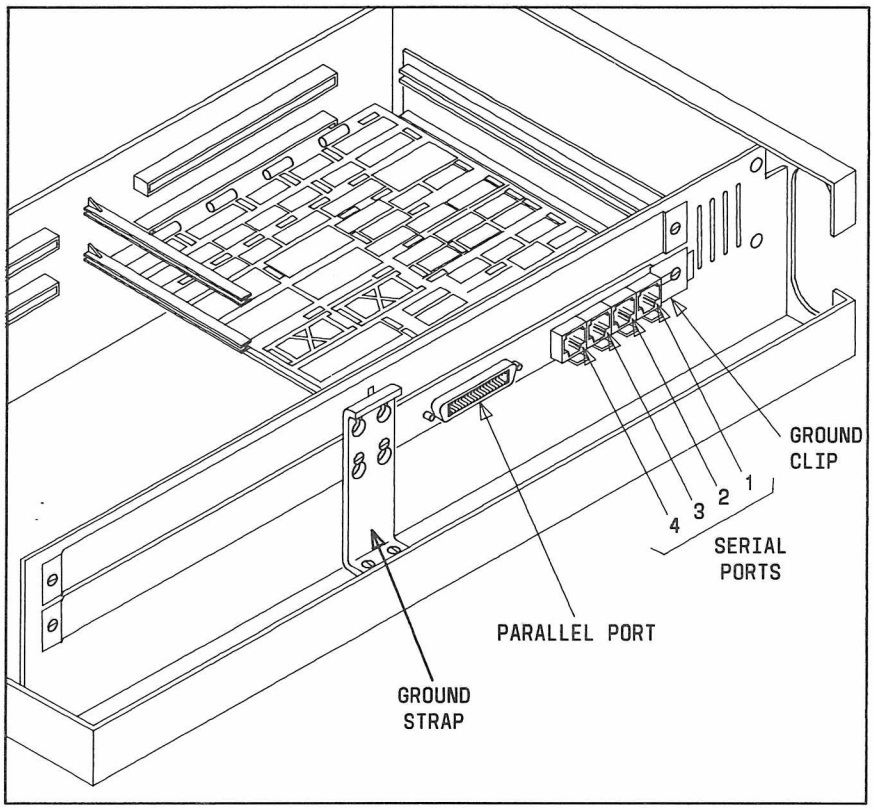

Figure 3-6. Example of Installed Feature Card

C. Replace Computer Cover

Note: For convenience, you might want to plug some connector cables into your expansion port jacks before replacing the cover. See " Connecting Devices" in Chapter 4 for details.

1. Replace top cover and four screws.
2. Plug in the power cord.
3. Feature hardware installed.

Remove or Replace

Removing or replacing hardware follows this outline:

A. Remove computer cover

B. Remove or replace feature card(s)

C. Replace computer cover.

Remove Computer Cover

See Part A, " Remove Computer Cover," in preceding section.

Remove or Replace Feature Card(s)

1. Loosen four screws holding the ground strap to the filler plates (Figure 3-3).
2. Remove two screws holding ground strap to chassis (Figure 3-3).
3. Loosen two screws holding the ground clip (Figure 3-6).
4. Remove ground strap and ground clip.
5. Remove appropriate feature card(s).
6. What is your purpose?

IF	THEN
Remove only	Reinstall filler plate(s)
Reposition	Install card in new slot
Replace	Install new feature card

Warning 1: Failure to replace filler plates over unused slots will disrupt cooling airflow and may cause radiation noncompliance with Class A limits of Subpart J, Part 15 of FCC Rules.

Warning 2: Handle feature card like a record album — only by the edges of the card.

7. Replace ground strap and ground clip (Figure 3-6). Start all screws before tightening any of them.

   Note: Always install ground clip at outside end of faceplate, opposite from the ground strap.

Replace Computer Cover

See Part C, " Replace Computer Cover," in preceding section.

TEST

Normal diagnostic testing of expansion ports is done automatically each time you bring up your 3B2 Computer. If you receive a diagnostic error message, consult your *3B2 Computer System Administrative Utilities Guide*. Otherwise, everything should be okay with your expansion ports.

Chapter 4

OPERATION

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Chapter 4

OPERATION

OPERATING

Expansion ports merely serve to properly connect supported devices to your 3B2 Computer. Once you install and setup an expansion port, it usually requires no further attention unless operating conditions change. Until then, use routine UNIX System commands to operate connected devices. These commands treat devices like special files.

CONNECTING DEVICES

Hardware

1. Remove cable access door by releasing latch and lifting out. (See Figure 3-1 if needed.)

2. Refer to Figure 4-1 while doing the following steps.

3. Connect device to proper cable and connector.

4. Route connector cable through rear opening to jack vicinity.

5. Plug connector cable into jack, as follows.

   A. To connect a modular plug to an expansion serial port jack, align and push it in until you hear a click. Connect the ground lead to the ground terminal underneath the jack. To release a modular plug, pinch the ear in and pull the plug out.

   B. On parallel ports, one screw is used to secure the adapter plug to the parallel port jack.

6. Mark a stick-on cable label for each connector cable.

7. Put the label on the new cabling outside the cabinet.

8. Attach connector labels on cable access door.

9. Replace cable access door.

10. Connect other end of cable to the device. Use 8-pin—to—25-pin connectors where needed.

11. If you have not already, set the device options. See your *3B2 Computer Owner/Operator Manual* and the terminal user manual for exact information on terminal setup. If you are connecting a printer or modem, see the user manual that came with it.

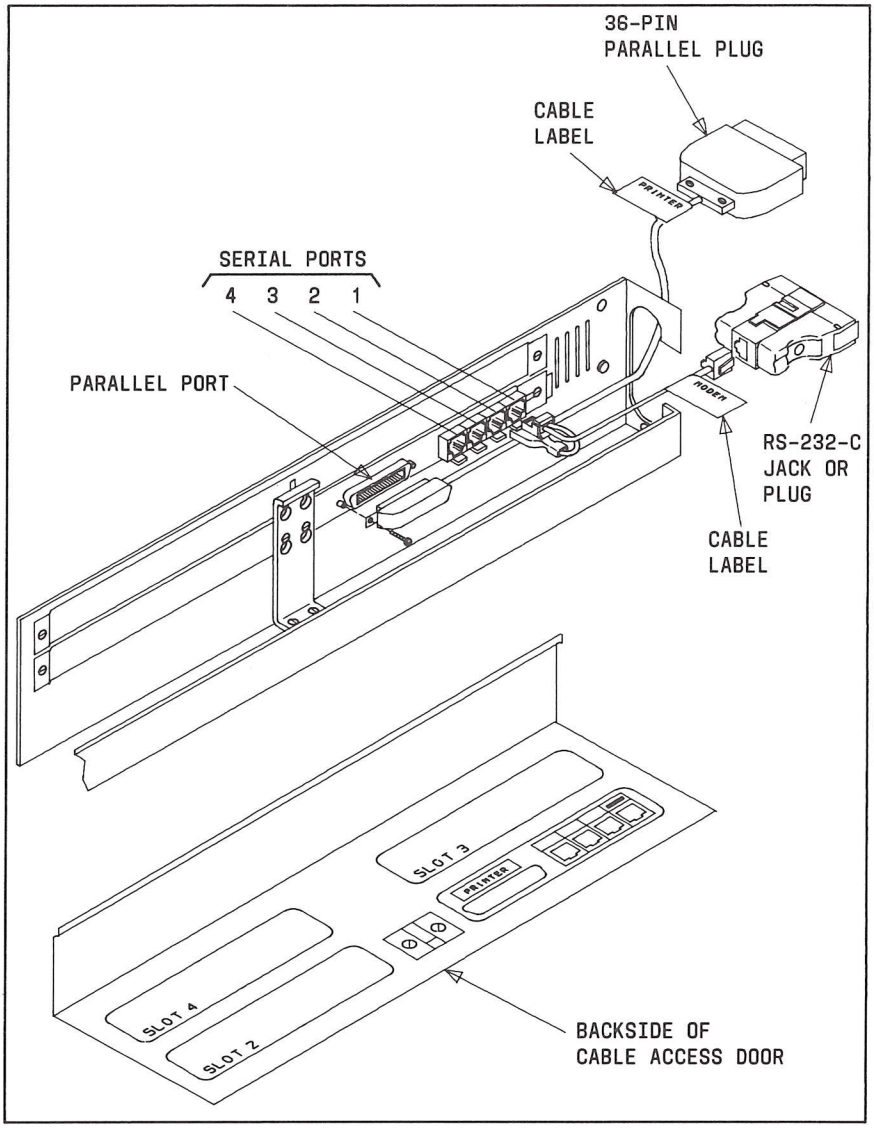

Figure 4-1. Installing Connector Cables for Devices

Software

Setup the software for your added expansion ports using Simple Administration. The subcommands of the TTY MANAGEMENT (ttymgmt) menu allow you to change the operating characteristics of ports. Within the TTY MANAGEMENT menu, ports are called " tty lines." In most cases, you will be making these changes for a terminal. With these subcommands, you can change the data transmission (baud) rate and the operating state (status) of a tty line.

> ***Note:*** Before attempting to use the subcommands of TTY MANAGEMENT, you may want to become familiar with the getty command and the gettydefs file. Refer to the *3B2 Computer System Administration Utilities Guide* for information on these subjects.

baud — This subcommand changes the baud rate of a tty line. The subcommand presents a list of changeable tty lines and a list of baud rates to choose from. When the change is made, the conditions of the tty line before and after the change are shown. Changing baud rates also causes a getty to be enabled (respawn) for the tty line.

disable — This subcommand allows you to disable (turn off) any changeable tty line. In this status, the computer disables getty and will not respond with a login message. This effectively blocks a terminal connected to this port from use. However, a printer can operate under the off status.

enable — This subcommand allows you to enable (respawn) any changeable tty line. When enabled, the getty for a tty line is respawn and logins are then permitted. A terminal will

operate under the respawn status.

Figure 4-2 shows an example use of the TTY MANAGEMENT menu to setup expansion ports for the first expansion ports feature card. This example turns on expansion serial ports 1, 2, and 3 and resets their baud rates for using terminals. Although expansion serial port 4 is left off, a serial printer can still be operated on this port in this status. This is also true for port 5, the parallel interface port.

The following conventions are used to show your terminal input and the system output.

```
This style of type is used to show system generated
responses displayed on your screen.

This style of bold type is used to show inputs
entered from your keyboard that are displayed on your
screen.

These bracket symbols, < > identify inputs from the
keyboard that are not displayed on your screen, such
as: <CR> carriage return, <CTRL d> control d, <ESC g>
escape g, passwords, and tabs.

This style of italic type is used for notes that
provide you with additional information.
```

```
Console login: <login ID><CR>
Password: <password><CR>   (Optional)
#sysadm ttymgmt<CR>
Password: <password><CR>   (Optional)

                        TTY MANAGEMENT
  1 baud            change the baud rate on a tty line
  2 disable         turn off a tty line
  3 enable          turn on a tty line

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP,  q to quit: 1<CR>

        The following is a list of the changeable tty lines:

                NAME              STATUS          BAUD
                contty            respawn         1200
                tty11             off             9600
                tty12             off             9600
                tty13             off             9600
                tty14             off             9600
                tty15             off             9600

You can change the baud rate to 300, 1200, 2400, 4800, 9600, 19200,  contty.

Enter tty line (11-14, 21-24, 31-34, 41-44, contty): 11<CR>
Enter baud rate: 19200<CR>

This is the tty line before the change.
11:2:off:/etc/getty tty11 9600

This is the tty line after the change.
11:2:repawn:/etc/getty tty11 19200

Do you want the table again? [y, n] y<CR>
        The following is a list of the changeable tty lines:

                NAME              STATUS          BAUD
                contty            respawn         1200
                tty11             respawn         19200
                tty12             off             9600
                tty13             off             9600
                tty14             off             9600
                tty15             off             9600

Do you want to do more? [y, n] y<CR>

You can change the baud rate to 300, 1200, 2400, 4800, 9600, 19200, contty.

Enter tty line (11-14, 21-24, 31-34, 41-44, contty): 12<CR>
Enter baud rate: 4800<CR>

This is the tty line before the change.
12:2:off:/etc/getty tty12 9600

This is the tty line after the change.
12:2:repawn:/etc/getty tty12 4800
```

Continued on next page

Figure 4-2. TTY MANAGEMENT Menu - Example (Sheet 1 of 2)

```
Do you want the table again? [y, n] y<CR>
        The following is a list of the changeable tty lines:

                NAME            STATUS          BAUD
                contty          respawn         1200
                tty11           respawn         19200
                tty12           respawn         4800
                tty13           off             9600
                tty14           off             9600
                tty15           off             9600

Do you want to do more? [y, n] n<CR>

Press the RETURN key to see the ttymgmt menu [?, q]:<CR>

                        TTY MANAGEMENT
  1 baud            change the baud rate on a tty line
  2 disable         turn off a tty line
  3 enable          turn on a tty line

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP,  q to quit: 3<CR>

        The following is a list of the changeable tty lines:

                NAME            STATUS          BAUD
                contty          respawn         1200
                tty11           respawn         19200
                tty12           respawn         4800
                tty13           off             9600
                tty14           off             9600
                tty15           off             9600

Enter tty line (11-14, 21-24, 31-34, 41-44, contty): 13<CR>

This is the tty line before the change.
12:2:off:/etc/getty tty12 9600

This is the tty line after the change.
13:2:repawn:/etc/getty tty13 9600

Do you want to see the table again? [y, n] y<CR>
        The following is a list of the changeable tty lines:

                NAME            STATUS          BAUD
                contty          respawn         1200
                tty11           respawn         19200
                tty12           respawn         4800
                tty13           respawn         9600
                tty14           off             9600
                tty15           off             9600

Do you want to do more? [y, n] q<CR>
#
```

Figure 4-2. TTY MANAGEMENT Menu - Example (Sheet 2 of 2)

After you setup your expansion ports, keep a written record using Figure 4-3.

BASIC NETWORKING

If you are using an expansion serial port to connect to other 3B Computers, refer to your *3B2 Computer Basic Networking Utilities Guide* for information on setup and operation.

LIMITATIONS

Expansion serial ports have several limitations.

Each feature card supports simultaneous output to four serial ports at 300, 1200, 2400, 4800, 9600, or 19200 baud each. The actual output rate may be somewhat less than the output rate set by the user, depending on the number of ports in continuous use. In this document, the term baud means the same as bits-per-second.

Each feature card can receive continuous character input without flow control or data loss through two serial ports at 9600 baud, three serial ports at 4800 baud, or four serial ports at 2400 baud and below. These limits are important for machine-to-machine communication applications only. For normal typed inputting or applications using flow control, all the serial ports of a feature card can be used at any allowable baud rate. If precise character input/output performance is critical to your application, contact your service representative.

Normally, a 3B2 Computer will use one parallel port for connecting a parallel printer. A parallel port has no known operational limitations.

EXPANSION FEATURE CARD	PORT NAME	PORT TYPE	STATUS	BAUD	DEVICE
1	tty11	Serial			
1	tty12	Serial			
1	tty13	Serial			
1	tty14	Serial			
1	tty15	Parallel			
2	tty21	Serial			
2	tty22	Serial			
2	tty23	Serial			
2	tty24	Serial			
2	tty25	Parallel			
3	tty31	Serial			
3	tty32	Serial			
3	tty33	Serial			
3	tty34	Serial			
3	tty35	Parallel			
4	tty41	Serial			
4	tty42	Serial			
4	tty43	Serial			
4	tty44	Serial			
4	tty45	Parallel			

Figure 4-3. Expansion Port Assignments

Chapter 5

TROUBLESHOOTING

Chapter 5

TROUBLESHOOTING

EXAMINATION

When an expansion port appears to have a problem, check for simpler problems first. Check these items carefully.

1. All connections okay?
2. Device plugged into live receptacle?
3. Device power switch on?
4. Other users having problems?
5. Device setup properly?
6. Software defined properly?
7. Diagnostics pass?

If the problem is still not solved, refer to Figure 5-1, Troubleshooting Chart, before calling your service representative.

PROBLEM	CAUSE	REMEDY
No login message	1. Terminal plugged into port configured for printer	1. Reconfigure port for terminal, or change to another port configured for a terminal
	2. No getty process running on port	2. From another terminal, check getty using the ps -ef command. If running, port is okay. Problem is with terminal. If not running, check device settings using simple entries Administration
	3. Faulty feature card	3. Call service representative.
Computer jibberish instead of a login message	Baud rate or parity mismatch	Match port baud rate to device settings using Simple Administration. Check parity setting on device.
Dead serial port	1. Port not enabled	1. Enable using Simple Administration
	2. Hung process	2. Turn off 3B2 Computer and turn back on.
Error message	Fault with hardware or software	Consult *3B2 Computer System Administration Utilities Guide.*

Figure 5-1. Troubleshooting Chart (Sheet 1 of 2)

PROBLEM	CAUSE	REMEDY
Two or more serial ports dead (no activity)	Faulty feature card	Call service representative.
Input from terminal not accepted	Terminal plugged into port configured for printer	Reconfigure port for terminal, or change to another port configured for a terminal
Dead printer	1. Incorrect configuration 2. LP (line printer) spooler faulty 3. Port not assigned right	1. Correct printer setup. See printer manual 2. Correct LP spooler. See spooler manual 3. Correct using Simple Administration.
Login message appears on printer	Printer plugged into port configured for terminal	Reconfigure port for printer, or change to another port configured for a printer.
Output for printer appears on terminal screen instead	1. Terminal plugged into port configured for printer 2. LP spooler faulty	1. Change terminal to another port, and plug in printer to port or Reconfigure port for terminal, and use another port for the printer 2. Correct LP spooler. See spooler manual.

Figure 5-1. Troubleshooting Chart (Sheet 2 of 2)

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